

**Notice of Allowability**

Application No.

09/309,038

Examiner

Ashwin Mehta

Applicant(s)

HEIFETZ ET AL.

Art Unit

1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to papers filed August 8, 2005 and the telephone interview of October 10, 2005.
2. ☒ The allowed claim(s) is/are 12,16-30,34-40,49,56,58,76-80 and 83-86.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)                                  |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>attached</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment  |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance                         |
|   | 9. <input type="checkbox"/> Other _____  |

***Objections and Rejections***

1. The objection to the specification for not providing the status of recited U.S. patent application serial numbers is withdrawn, in light of the amendments.
2. The rejection of claims 12, 16-30, 34-40, 49, 56, 58, 72, 73, and 76-89 under 35 U.S.C. 112, first paragraph is withdrawn, in light of the claim amendments.
3. The rejection of claim 81 under 35 U.S.C. 112, 1<sup>st</sup> paragraph, is withdrawn in light of its cancellation.
4. The rejection of claims 12, 16-30, 34-40, 49, 56, 58, 73, 76-89 under 35 U.S.C. 112, first paragraph is withdrawn in light of the claim amendments.
5. The rejection of claims 12, 16-30, 34-40, 49, 56, 58, 73, 76-80, and 83-89 under 35 U.S.C. 103(a) is withdrawn in light of the claim amendments and further consideration.

***Examiner's Amendment***

6. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

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Authorization for this examiner's amendment was given in a telephone interview with Mary Kakefuda on October 20, 2005.

The application has been amended as follows:

In the claims:

12. A method for conferring resistance or tolerance to more than one virus selected from the group consisting of a furovirus, potyvirus, tospovirus, and cucumovirus upon a plant cell comprising the step of: introducing into a plant cell more than one pair of DNA sequences, wherein for each pair, the first DNA sequence encodes a portion of the viral genome of a furovirus, potyvirus, tospovirus, or cucumovirus, and the second DNA sequence of the pair encodes a sequence that is antisense to the first DNA sequence, such that the RNA sequences encoded by the first and second DNA sequences of a pair form a double-stranded RNA molecule when expressed in said plant cell, resulting, upon viral infection, in reduced expression of the portion of the viral genome from which the DNA sequences of that pair were derived, and wherein at least two of the introduced pairs of DNA sequences were derived from different viruses of said group, resulting in resistance or tolerance of said plant cell to more than one virus of said group [a first DNA sequence encoding a sense RNA fragment of more than one virus from a furovirus, potyvirus, tospovirus or cucumovirus genome or portion thereof and a second DNA sequence encoding an antisense RNA fragment of more than one virus from a furovirus, potyvirus, tospovirus or cucumovirus genome or portion thereof, wherein said sense RNA fragment and said antisense RNA fragment form a double-stranded RNA molecule when expressed in plant cell, wherein the fragments of RNA are at least 452 nucleotides in length and

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wherein the expression of said viral genome portion viral genomes or portions thereof in said cell is reduced, and wherein said plant cell has resistance or tolerance to more than one virus selected from the group consisting of furovirus, potyvirus, tospovirus and cucomovirus, respectively].

16. The method of claim 12, wherein the first DNA sequence of a pair [said DNA sequences] comprises a nucleotide sequence obtained from a viral coat protein gene, a viral nucleocapsid protein gene, a viral replicase gene, a movement protein gene or portions thereof.

17. The method of claim 12, wherein said first DNA sequence and said second DNA sequence of each pair are stably integrated in the genome of said cell.

18. The method of claim 12, wherein said first DNA sequence and said second DNA sequence of each pair are comprised in two different DNA molecules.

19. The method of claim 18, wherein said DNA sequences [molecules] further comprise a first promoter operably linked to said first DNA sequence and a second promoter operably linked to said second DNA sequence of each pair.

20. The method of claim 12, wherein said first DNA sequence and said second DNA sequence of a pair are comprised in one DNA molecule.

21. The method of claim 20, wherein said first DNA sequence and said second DNA

sequence of a pair are comprised in the same DNA strand of said DNA molecule.

22. The method of claim 21, wherein said RNA sequences encoded by said first and second DNA sequences of a pair [sense RNA fragment and said antisense RNA fragment] are comprised in one RNA molecule.

23. The method of claim 22, wherein said RNA molecule is capable of folding such that said RNA sequences [fragments] comprised therein form a double-stranded region.

24. The method of claim 22, wherein said DNA molecule further comprises a promoter operably linked to said first and [or] said second DNA sequence.

30. The method of claim 22, wherein said DNA molecule further comprises a linker between the first and second DNA sequences [encoding said sense RNA fragment and said antisense RNA fragments].

35. The method of claim 21, wherein said RNA sequences encoded by the first and second DNA sequences [sense RNA fragment and said antisense RNA fragment] are comprised in two RNA molecules.

58. Seeds produced from the plant of claim 56, wherein said seeds are

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resistant or tolerant to more than one virus selected from the group consisting of said furovirus, potyvirus, tospovirus and cucomovirus and comprise said more than one pair of DNA sequences.

Claim 73 was cancelled.

77. The method of claim 12, wherein one of said pairs of DNA sequences comprises a nucleotide sequence obtained from a furovirus replicase gene or portion thereof.

78. The method of claim 12, wherein one of said pairs of DNA sequences comprises a nucleotide sequence obtained from the beet necrotic yellow vein virus (BNYVV).

79. The method of claim 78, wherein said pair DNA sequences comprises a nucleotide sequence obtained from the replicase gene (RNA1) of the beet necrotic yellow vein virus or portion thereof.

83. The method of claim 12, wherein one of said pairs of DNA sequences comprises a nucleotide sequence obtained from a potyvirus [or portion thereof].

84. The method of claim 12, wherein one of said pairs of DNA sequences comprises a nucleotide sequence obtained from a tospovirus [or portion thereof].

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85. The method of claim 12, wherein one of said pairs of DNA sequences comprises a nucleotide sequence obtained from a cucumovirus [or portion thereof].

86. Progeny obtained from the plant of claim 56, wherein said progeny are resistant or tolerant to more than one virus selected from the group consisting of said furovirus, potyvirus, tospovirus and cucumovirus, and wherein said progeny comprise said more than one pair of DNA sequences.

In the title: The title was replaced with the following title:

--A METHOD FOR CONFERRING RESISTANCE OR TOLERANCE AGAINST  
FUROVIRUS, POTYVIRUS, TOSPOVIRUS, AND CUCOMOVIRUS TO PLANT  
CELLS--

In the abstract: the abstract has been amended as follows:

The present invention relates to a method [methods] to confer resistance or tolerance to more than one virus from the group consisting of furovirus, potyvirus, tospovirus, and cucumovirus, [alter the expression of a gene in a cell] using sense and antisense RNA fragments of a sequence from their genomes [the gene]. The sense and antisense RNA fragments are capable of pairing and forming a double-stranded RNA molecule, thereby reducing expression of the viral genome [altering the expression of the

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gene. The present invention also relates to cells, plants or animal, their progeny and seeds derived thereof, obtained using a method of the present invention. Preferably, such cells, plants or animals are resistant or tolerant to viruses].

7. Claims 12, 16-30, 34-40, 49, 56, 58, 76-80, and 83-86 are allowed.

The following is an examiner's statement of reasons for allowance: Applicants have developed a method to confer resistance or tolerance to more than one virus from the group consisting of a furovirus, potyvirus, tospovirus, and cucumovirus. The method comprises introducing into a plant cell more than one pair of DNA sequences, wherein for each pair, the first DNA sequence encodes a portion of the viral genome of a furovirus, potyvirus, tospovirus, or cucumovirus, and the second DNA sequence of the pair encodes a sequence that is antisense to the first DNA sequence, such that the RNA sequences encoded by the first and second DNA sequences of a pair form a double-stranded RNA molecule when expressed in said plant cell. The expressed double-stranded RNA molecule will inhibit expression of the virus from which the nucleotide sequences were derived, thereby conferring resistance or tolerance to the plant cell. Fire et al. (U.S. Patent No. 6,506,559) teaches a method to inhibit expression of a target gene in a cell comprising formation of a double-stranded RNA in a cell, wherein one strand of the RNA corresponds to a nucleotide sequence found within a target gene and wherein the second strand is complementary to the first strand, and the double stranded RNA inhibits expression of the target gene, wherein the cell can be a plant cell and the target gene may be a



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viral gene. However, Fire et al. do not suggest conferring resistance to any particular viruses, including furoviruses, potyviruses, tospoviruses, and cucomoviruses. Other prior art do not teach or fairly suggest expressing double stranded RNAs corresponding to sequences found within the viral genomes of at least two viruses from the particular group of furovirus, tospovirus, potyvirus, and cucomovirus.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

#### ***Contact Information***

Any inquiry concerning this or earlier communications from the Examiner should be directed to Ashwin Mehta, whose telephone number is 571-272-0803. The Examiner can normally be reached from 8:00 A.M to 5:30 P.M. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Gary Jones, can be reached at 571-272-0745. The fax phone numbers for the organization where this application or proceeding is assigned are 571-273-8300. Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now contact the USPTO's Patent Electronic Business Center (Patent EBC) for assistance. Representatives are available to answer your questions daily from 6 am to midnight (EST). The toll free number is (866) 217-9197. When calling please have your application serial or patent number, the type of document you are having an image problem with, the number of pages and the specific nature of the problem. The Patent Electronic Business Center will notify applicants of the resolution of the problem within 5-7 business days. Applicants can also check PAIR to confirm that the problem has been corrected. The USPTO's Patent Electronic Business Center is a complete service center supporting all patent business on the Internet. The USPTO's PAIR system provides Internet-based access to patent application status and history information. It also enables applicants to view the scanned images of their own application file folder(s) as well as general patent information available to the public. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>.

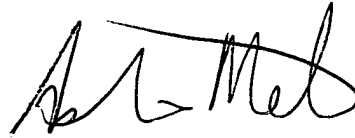
For all other customer support, please call the USPTO Call Center (UCC) at 800-786-9199.

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October 20, 2005

A handwritten signature in black ink, appearing to read 'Ashwin D. Mehta', written in a cursive style.

Ashwin D. Mehta, Ph.D.

Primary Examiner

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